Public Comment Matrix

Originating Office: AIR-6B0	Document Description: TSO-C207a	Project Lead/Reviewer David Robinson	Reviewing Office:	Date of Review: 8/17/2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
1.	Garmin	Sec. 3.a, Pg. 1	The paragraph begins with the sentences: "This TSO's standards apply to equipment intended to provide data link communication in the airport environment. This includes Air Traffic Services (ATS), Aeronautical Operational Communication (AOC) including aeronautical information services and meteorological (AIS/MET) information, Airline Administrative Communication (AAC), and Airport Authority communication, as well as Aircraft Access to System Wide Information Management (SWIM) services." The wording in this paragraph could be read to apply to any "equipment intended to provide data link communication in the airport environment" including Gatelink or satcom. Additionally, the wording could be read to apply to any equipment providing ATS, AOC, AIS/MET, AAC or SWIM access at any time. It does not appear as if the TSO is	Update the wording to explicitly state the TSO applies only to "AeroMACS intended to provide data link communication in the airport environment." Additionally, update the application list to state, "AeroMACS equipment may provide access in the airport environment to one or more of Air Traffic Services (ATS), Aeronautical Operational Communication (AOC) including aeronautical information services and meteorological (AIS/MET) information, Airline Administrative Communication (AAC), and Airport Authority communication, as well as Aircraft Access to System Wide Information Management (SWIM) services." Additionally, narrowing the	Substantively concur, with minor editorial changes. The applicable minimum operational performance standard (MOPS), RTCA/DO-346, is specific to AeroMACS equipment. The commenter is correct that the scope of this TSO is intended to be limited to AeroMACS equipment, and not to other types of data communications equipment. Changed section to read, "This TSO's standards apply to AeroMACS equipment intended to provide data link communication in the airport environment. AeroMACS equipment may provide access in the airport environment to one or more of the following services: Air Traffic Services (ATS), Aeronautical Operational Communication (AOC) including aeronautical

Public Comment Matrix

Originating Office: AIR-6B0	Document Description: TSO-C207a	Project Lead/Reviewer David Robinson	Reviewing Office:	Date of Review: 8/17/2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
			intended to apply this broadly.	scope of 3.a will help with the rationale of 3.b by limiting the minor failure condition to the link itself, rather than the applications.	information services and meteorological (AIS/MET) information, Airline Administrative Communication (AAC), and Airport Authority communication, as well as Aircraft Access to System Wide Information Management (SWIM) services."
2.	Garmin	3.b and subparagraphs (1) thru (3), Page 2	Paragraph. 3.b.(3) includes the statement: Design the system to at least the above failure condition classifications. Wording needs to change to allow failure condition to be determined at the aircraft level. This statement implies the failure condition classification of an article is determined by the TSO regardless of mitigations employed to meet aircraft level safety requirements such as redundant appliances/systems. Unless the	Suggest changing to the alternate wording identified in paragraph 3.b. of the TSO Template in Order 8150.1D Appendix G.	Nonconcur. The failure effects specified in the TSO, as written, are the aircraft level effects. We determined that for AeroMACS AMS equipment, the failure effects described in the TSO as currently written are the most appropriate description of the aircraft-level failure effects and associated design requirements for its environment.

Public Comment Matrix

Originating Office:	Document Description: TSO-C207a	Project Lead/Reviewer	Reviewing Office:	Date of Review:
AIR-6B0		David Robinson		8/17/2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
			DAL cannot be affected by the installation, the aircraft System Safety Assessment should determine the failure classification and by extension, the design assurance level (DAL) requirement. The aircraft FHA/SSA ultimately determines the DAL requirement for a particular installation. Specifying the DAL at the article level without the benefit of the specific aircraft level FHA/SSA means that in some cases the DAL will undoubtedly be higher and more costly than necessary. This will have a chilling effect on the installation of new, safety enhancing technologies since the cost will be greater than necessary. It is possible to build and certify a TSOA article that cannot be approved for installation in one or more aircraft types because it does not have the required DAL. Similarly, just because the article meets a TSO DAL does not mean it can be approved for installation. We recommend that no failure classification/DAL requirement be included in a TSO when the installation can affect or mitigate the hazard level and therefore consideration should be		

Public Comment Matrix

Originating Office:	Document Description: TSO-C207a	Project Lead/Reviewer	Reviewing Office:	Date of Review:
AIR-6B0		David Robinson		8/17/2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
			given to revising paragraph 3.c in this TSO to the general guidance in the Recommendation column.		
3.	Garmin	Sec. 3.b.(1), Pg. 2, Note 1	The Note begins with: "Failure of the communications system resulting in display of corrupted or misleading ATS information is a *major* failure condition." This is not entirely accurate. RTCA/DO-290 Chg 2 ("Safety and Performance Standard for Air Traffic Data Link Services in Continental Airspace (Continental SPR Standard)") and RTCA/DO-306 ("Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace") both define "Class 3" hazards (see Table 1-1 in both documents). "Class 3" hazards are the items that rise above a minor failure classification. Table 5-1 in DO-306 defines a handful of "Class 3" hazards that all generally relate to undetected issues with messages. A similar table with similar information appears in DO-290.	Redraft the note to indicate that, in the case of ATS applications, the equipment may contribute to a different failure condition as determined by the failure at the aircraft level. Guidance material for some ATS applications categorizes undetected corruption or misleading information as a major failure condition. Note that the system design should take this into account.	Partially concur. Revised to read: "The minor failure condition classification is based on the network protocol and or application system layers above the AeroMACS AMS equipment to detect and annunciate errors that would result in misleading or missing ATS messages."

Public Comment Matrix

Originating Office:	Document Description: TSO-C207a	Project Lead/Reviewer	Reviewing Office:	Date of Review:
AIR-6B0		David Robinson		8/17/2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
			Further, the term "ATS" has also long been applied to ACARS services defined in ARINC 623 ("Character-Oriented Air Traffic Service (ATS) Applications"). These applications include D-ATIS. These systems may also have detected loss of or corruption of a message listed as a minor failure, but undetected corruption of a message listed as a major failure.		
4.	Garmin	Sec. 3.b.(1), Pg. 2, Note 1	The last sentence of the note states: "Therefore, installation approval will require demonstration of where and how undetected errors and misleading information are mitigated in the system." The TSO is imposing requirements on the aircraft level. Traditionally, this guidance is given in an advisory circular. For example, installation guidance for ATS communications systems is already provided in AC 20-140C ("Guidelines for Design Approval of Aircraft Data Link Communication Systems Supporting Air Traffic Services (ATS)").	Remove the aircraft-level requirement from the TSO. Update AC 20-140C or draft a new AC with this requirement if it is deemed necessary.	Concur. Revised to read: "The minor failure condition classification is based on the network protocol and or application system layers above the AeroMACS AMS equipment to detect and annunciate errors that would result in misleading or missing ATS messages." This note in the TSO is intended to emphasize that the aircraft-level safety requirement is more stringent than the intrinsic level of

Public Comment Matrix

Originating Office: AIR-6B0	Document Description: TSO-C207a	Project Lead/Reviewer David Robinson	Reviewing Office:	Date of Review: 8/17/2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
			Additionally, the use of the term "will" in the last sentence is unclear.		protection provided by the AeroMACS AMS equipment, and that installers will therefore have to demonstrate appropriate protection for the installed system. AC 20-140C ("Guidelines for Design Approval of Data Link Communication Systems Supporting Air Traffic Services (ATS)") will be revised as necessary to provide installation and detection demonstration guidance for AeroMACS AMS equipment. .
5.	Garmin	Sec. 3.b.(1), Pg. 2, Note 2	The wording of the note implies that simply adding AeroMACS equipment provides "connectivity to unauthorized access." There are installations that may use only "trusted" applications and therefore fall into the exceptions listed in PS-AIR-21.16-02 Revision 2.	Redraft the note as follows: Note 2: A security risk assessment may be needed for this equipment, dependent on the applications used in a given installation. For more information see Aircraft Certification Service (AIR) policy statement PS-AIR-	Partially concur. The TSO as written states that a security risk assessment *may be* (not *will be*) required, subject to the provisions of PS-AIR-21.16-02. No change is necessary to the existing wording in this regard. We agree it may be helpful to place more

Public Comment Matrix

Originating Office: AIR-6B0	Document Description: TSO-C207a	Project Lead/Reviewer David Robinson	Reviewing Office:	Date of Review: 8/17/2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
				21.16-02, Revision 2, Establishment of Special Conditions for Cyber Security.	emphasis on the *potential* for unauthorized connectivity, rather than implying that it will occur. Changed first sentence to read, "…TSO functions *that provide potential for* connectivity to unauthorized access…".
6.	Garmin	3.f Page 3	Including this specific DO-254 reference is redundant to the rest of the paragraph in this section. For custom airborne electronic hardware determined to be simple, RTCA/DO-254, paragraph 1.6 applies. DO-254 makes it clear how to address "simple" custom airborne electronic hardware.	Remove this reference to DO-254 Paragraph 1.6.	Concur. Template does not require an airborne electronic hardware paragraph if failure condition classification of paragraph 3.b is minor. Deleted the Electronic Hardware Qualification paragraph.
7.	Garmin	4.b.(2) Page 3	Paragraph 4.b.(2) states: Each subassembly of the article that you determined may be interchangeable. This language is confusing.	The language for this requirement is confusing. This could mean that a stuffed printed circuit board needs the TSO number. Suggest removing the	Concur. In accordance with new template in recently published Order 8150.1D, Paragraph 4.b as contained in the draft TSO circulated for public review is no longer

Public Comment Matrix

Originating Office: AIR-6B0	Document Description: TSO-C207a	Project Lead/Reviewer David Robinson	Reviewing Office:	Date of Review: 8/17/2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
				statement or updating to wording identified in paragraph 4.b. of the TSO Template in Order 8150.1D Appendix G.	required and has been deleted from the final TSO.
8.	Garmin	5.f Page 5	Paragraph. 5.f includes the statement: Identify functionality or performance contained in the article not evaluated under paragraph **3** of this TSO (that is, non-TSO functions). The GAMA 16-28 "Industry Recommendations on the Management of Non-Technical Standard Order Functions" Recommendation 2 recommended revising the Appendix G TSO template to remove "or performance" from the quoted paragraph 5.f statement to ensure non-TSO function definitions are "fully aligned with the original intended N8150.3 definition". This recommendation was not addressed when FAA Order 8150.1D was published.	1) Remove "or performance" in accordance with the GAMA non-TSO function recommendations. 2) Update Order 8150.1D Appendix G paragraph 5.f in accordance with the GAMA recommendations. 3) Work with GAMA to address all the non-TSO function recommendations.	Nonconcur. The template language of 8150.1D retains the "or performance" language. To the extent AIR-6C1 (formerly AIR-111) continues to work with GAMA to address the 16-28 recommendations, that activity is beyond the scope of this TSO. We anticipate any additional changes determined to be necessary will be incorporated into a future revision of Order 8150.1().

Public Comment Matrix

Originating Office: AIR-6B0	Document Description: TSO-C207a	Project Lead/Reviewer David Robinson	Reviewing Office:	Date of Review: 8/17/2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
9.	Mmo Aviation Services, Inc. Jana H. Young Chief Engineer & DER	3.b(1) page 2	Failure of the function defined in paragraph **3.a** is a *minor* failure condition. I would annotate this to be un-annunciated failure. I still think that a missed message has higher than Minor consequences. Note: "Functionality" If you're thinking encapsulated CRCs, I wouldn't really call that functionality. It's more of a message credibility scheme protecting against undetected, unintentional processor or transceiver corruption of message content and to some extent against cyber attack.		Partially concur. Failure of the AeroMACS AMS equipment is minor, so no change to the failure condition classification in this TSO needed. Paragraph 3.b.(1) now reads, "The minor failure condition classification is based on the network protocol and or application system layers above the AeroMACS AMS equipment to detect and annunciate errors that would result in misleading or missing ATS messages."
10.	Mmo Aviation Services, Inc. Jana H. Young Chief Engineer & DER	3.b(2) page 2	Loss of the function defined in paragraph **3.a** is a *minor* failure condition: I would annotate this to be un-annunciated failure. I still think that a missed message has higher than Minor consequences.		Concur, for equipment used for ATS communications. Unannunciated loss of AeroMACS function when used for ATS messages may have greater than minor failure effect. Therefore, for ATS use, to keep the failure condition classification at

Public Comment Matrix

Originating Office: AIR-6B0	Document Description: TSO-C207a	Project Lead/Reviewer David Robinson	Reviewing Office:	Date of Review: 8/17/2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
					minor, loss of AeroMACS function must be annunciated in order to prevent a missed ATS message. Revised paragraph 3.b(2) accordingly.
11.	Mmo Aviation Services, Inc. Jana H. Young Chief Engineer & DER	3.e & f page 3	Just a thought, and may not be appropriate for inclusion in a TSO. On a Non-advocate PSSA review I just finished, the author of the PSSA (and presumably the designers) thought that if functions were implemented in simple hardware, that they didn't need to meet the probability of failure associated with the severity of the functional failure (in this case, Hazardous). SAE ARP-4761 applies regardless of implementation.		Comment appears to be out of scope for this TSO. Failure condition classification of the equipment addressed in this TSO is Minor, not Hazardous. More generally, the TSO template in Order 8150.1D, Appendix G, instructs inclusion of the following requirement for airborne electronic hardware used in equipment with a Major, Hazardous, or Catastrophic failure condition classification: "For custom airborne electronic hardware determined to be simple, RTCA/DO-254, paragraph 1.6 applies." RTCA/DO-254, Paragraph 1.6, in turn, states

Public Comment Matrix

Originating Office: AIR-6B0	Document Description: TSO-C207a	Project Lead/Reviewer David Robinson	Reviewing Office:	Date of Review: 8/17/2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
					in part: "…A hardware item is identified as simple only if a comprehensive combination of deterministic tests and analyses appropriate to the design assurance level can ensure correct functional performance under all foreseeable operating conditions with no anomalous behavior. When an item cannot be classified as simple, it should be classified as complex…." Since the AeroMACS equipment has only a Minor failure condition classification, inclusion of Paragraph 3.f is not required by the Order 8150.1D template and it is therefore not included in this TSO.
12.	Mmo Aviation Services, Inc. Jana H. Young Chief	Section 5 page 4	**APPLICATION DATA REQUIREMENTS.** You must give the FAA aircraft certification office (ACO) manager responsible for your facility a statement of conformance, I don't see anything in here to cover SSA		SSA, if needed, would be covered under paragraphs 5.i (List of all drawings and processes (including revision level) that define the article's design) and/or 5.j (Manufacturer's TSO

Public Comment Matrix

Originating Office: AIR-6B0	Document Description: TSO-C207a	Project Lead/Reviewer David Robinson	Reviewing Office:	Date of Review: 8/17/2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
	Engineer & DER		report.		qualification report showing results of testing accomplished according to paragraph **3.c** of this TSO) of the application data requirements of the TSO. No change made.
13.	Mmo Aviation Services, Inc. Jana H. Young Chief Engineer & DER	3.b(1)	**Note 1:** Failure of the communications system resulting in display of corrupted or misleading ATS information is a *major* failure condition. AeroMACS AMS equipment does not, in its entirety, provide functionality within the article to protect against misleading ATS communications or to detect corrupted messages	**Add "**in its entirety," to second sentence.	Partially concur. We acknowledge that the AeroMACS AMS equipment must be designed to a certain level of design assurance as specified by this TSO. However, the AeroMACS AMS equipment is not designed to intrinsically provide protection against greater than minor failure effects. As such, more severe failures must therefore be protected against by other elements of the communications system. Paragraph 3.b.(1) reads: "…The minor failure condition classification is based on the network

Public Comment Matrix

Originating Office:	Document Description: TSO-C207a	Project Lead/Reviewer	Reviewing Office:	Date of Review:
AIR-6B0		David Robinson		8/17/2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
					protocol and or application system layers above the AeroMACS AMS equipment to detect and annunciate errors that would result in misleading or missing ATS messages.”